Articles

Contributions of the History, Physical Examination, and Laboratory Investigation in Making Medical Diagnoses

MICHAEL C. PETERSON, MD, *Morgantown, West Virginia;* JOHN H. HOLBROOK, MD; DE VON HALES, MD; N. LEE SMITH, MD; *and* LARRY V. STAKER, MD, *Salt Lake City, Utah*

We report an attempt to quantitate the relative contributions of the history, physical examination, and laboratory investigation in making medical diagnoses. In this prospective study of 80 medical outpatients with new or previously undiagnosed conditions, internists were asked to list their differential diagnoses and to estimate their confidence in each diagnostic possibility after the history, after the physical examination, and after the laboratory investigation. In 61 patients (76%), the history led to the final diagnosis. The physical examination led to the diagnosis in 10 patients (12%), and the laboratory investigation led to the diagnosis in 9 patients (11%). The internists' confidence in the correct diagnosis increased from 7.1 on a scale of 1 to 10 after the history to 8.2 after the physical examination and 9.3 after the laboratory investigation. These data support the concept that most diagnoses are made from the medical history. The results of physical examination and the laboratory investigation led to fewer diagnoses, but they were instrumental in excluding certain diagnostic possibilities and in increasing the physicians' confidence in their diagnoses.

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Arriving at most medical diagnoses requires information obtained from the history, the physical examination, and the laboratory investigation. In 1947 Platt claimed that in most cases the diagnosis can be made with the history alone.[1] In 1975 Hampton and co-workers attempted to evaluate the relative contributions of the history, the physical examination, and laboratory tests in making medical diagnoses in their study of 80 referral patients at a general medicine clinic.[2] Internists were asked to record their presumptive diagnosis, their prediction of management, and their confidence in their diagnosis (or diagnoses) on a scale of 1 to 10 after reading the referral letter and taking the history, after completing the physical examination, and again after completing the laboratory investigation. These diagnoses were compared with those accepted two months after the initial visit. They found that the diagnosis predicted after taking the history agreed with the accepted diagnosis two months after the initial visit in 66 of the 80 patients (82%). The physical examination led to the diagnosis in 7 patients (9%), and the laboratory investigation led to the diagnosis in the other 7 patients (9%).

In a similar study of 630 of his own patients at a clinic with a "cardiological bias," Sandler reported that 56%, 17%, and 23% of his diagnoses were made from the history, physical examination, and laboratory investigation, respectively.[3] Gruppen and associates reported in a study of 119 patients at a primary care walk-in clinic that greater than 90% of their diagnoses were made after the physician heard the chief complaint, read the nurse's intake note, and completed the history taking.[4] In 95% of their patients, the correct diagnosis appeared in the differential diagnosis list after the history was taken.

During the 16 years since the initial study by Hampton and colleagues,[2] there has been a substantial increase in medical technology. In addition, medical school curricula have placed increased emphasis on medical technology while the teaching of bedside skills has languished.

We report here our efforts to quantitate the importance of the history, the physical examination, and the laboratory investigation in making medical diagnoses. This is a prospective study of 80 patients in a general medicine outpatient clinic with new or previously undiagnosed problems using a protocol similar to that used by Hampton and co-workers.[2]

Patients and Methods

All four attending internists at the University of Utah Wasatch Clinics (Salt Lake City) completed standardized questionnaires for 80 general medical outpatients. The patients were nonconsecutive because only those with new or previously undiagnosed conditions were included. Of the 80 patients, 41 (51%) were men; the mean age was 48 years. One was Asian, one was African American, and the rest were white, one being of Hispanic origin. Both physician-referred and self-referred patients were included in the study. In two cases the internist was unable to make a diagnosis and referred these patients to subspecialists; these patients were not included in the study. Seven patients were included in the study more than once for separate medical problems. Five cases of asymptomatic bacteriuria found on routine urinalysis were excluded.

After completing the history, the internists were asked to record their differential diagnosis and their level of confidence for each possible diagnosis on a scale of 1 to 10. Confidence scores always totaled 10, and physicians were allowed to list "don't know" as a diagnosis. As an example, a

From the Department of Medicine, West Virginia University, Morgantown (Dr Peterson); the Division of General Internal Medicine, University of Utah Medical Center (Dr Holbrook), and the University of Utah Wasatch Clinics (Drs Hales, Smith, and Staker), Salt Lake City.

Reprint requests to John H. Holbrook, MD, University of Utah School of Medicine, Division of General Internal Medicine, 50 N Medical Dr, Salt Lake City, UT 84132.

portion of a questionnaire completed for a patient who complained of chest pain could have appeared as follows:

Diagnosis	*Confidence Score*
1. Unstable angina	7
2. Myocardial infarction	2
3. Esophageal spasm	1
	10

After completing the physical examination and again after the laboratory investigation, physicians were asked to list their revised differential diagnosis and a confidence score for each diagnostic possibility they gave as in the example above.

Two months or more after the initial visit, the patient's records were reviewed to see what the accepted diagnosis was at that time. This diagnosis was accepted as the "gold standard" for the purpose of this study.

Confidence intervals were calculated using the commonly accepted formula.[5]*

Results

In 61 of 80 cases (76%, with a 95% confidence interval [CI] of 65.6, 85.9), the leading diagnosis after taking the history agreed with the diagnosis accepted at the time the record was reviewed two months after the initial visit. In 10 cases, after the physical examination was completed, the differential diagnosis was revised so that the leading diagnosis then agreed with the finally accepted diagnosis. In 9 cases, the laboratory investigation led to the finally accepted diagnosis (Table 1).

The mean confidence score for the provisional diagnoses after the history was 7.1, after the physical examination it was 8.2, and after the laboratory investigation it was 9.3. In 70 of 80 cases (88%; 95% CI 79.8, 95.2), the final diagnosis was listed in the differential diagnosis after completing the history.

In 27 of 80 cases, the findings of the physical examination helped to increase the physician's confidence in the diagnosis; in 4 cases, these findings decreased the confidence in the diagnosis. In 22 cases, the results of the laboratory evaluation increased the physician's confidence in the diagnosis; in 1 case, they decreased the confidence in the diagnosis. The types of diagnoses made from the history, the physical examination, and the laboratory investigation are listed in Table 2.

Discussion

This study supports the widely held belief that the "history is the most powerful diagnostic tool available to the internist."[6,7] The narrow 95% confidence interval around the estimate of 76% suggests that chance is not an explanation for these findings. The results of our study agree most closely with those of Hampton and associates,[2] whose study was also completed in a general medicine clinic. Sandler found that the contribution of the history to making medical diagnoses varied considerably with the type of disease being considered. He diagnosed 69% of cardiovascular problems from the history but was able to diagnose only 29% of gastrointestinal problems from the history.

It appears that the history, physical examination, and laboratory investigation are all useful in generating and testing hypotheses. In our study, for example, some of the diagnoses made from the results of the physical examination and laboratory investigation were completely unsuspected after the history was completed. Gruppen and colleagues gave some empiric data to show that the history as well as the physical examination and laboratory investigation are useful in testing and excluding hypotheses.[4]

In our study, as in office practice, it was difficult to separate information obtained from the history, the physical examination, and the laboratory investigation. The physical examination, for example, begins with noticing a patient's general appearance during the history taking. Similarly, the physical examination is not done nor laboratory study results interpreted in a vacuum without already knowing historical points.

*Joseph L. Lyon, MD, MPH, statistically analyzed the data.

TABLE 1.—*The Number and Percentage of Cases Are Given in Which the Final Diagnosis Was Arrived at After the History, the Physical Examination, and the Laboratory Investigation (N = 80)*

Type of Evaluation	*Cases in Which Final Diagnosis Made*		*95% CI*
	No.	*(%)*	
History	61	(76)	65.6, 85.9
Physical examination	10	(12)	0, 33.0
Laboratory tests	9	(11)	0, 31.9
Physical examination and laboratory tests	19	(24)	4.6, 42.9

CI = confidence interval

TABLE 2.—*Diagnoses Made From the History, the Physical Examination, and the Laboratory Studies (N = 80)*

*Medical Diagnoses**	*Medical Diagnoses**
History	Irregular menses due to birth control pills
Depression (5)	Asthma
General anxiety syndrome (3)	Peptic ulcer disease
Osteoarthritis (2)	Benign leg cramps
Chronic bronchitis (2)	Knee pain due to increased activity
Allergic rhinitis (2)	Spasticity due to CVA
Bursitis (2)	Gilbert's syndrome
Prostatitis (2)	Irregular menses due to menopause onset
Irritable bowel syndrome (2)	Incisional hernia
Panic disorder (2)	Carpal tunnel syndrome
Fatigue (2)	**Physical Examination**
Chest wall pain (2)	Bursitis (2)
Monilial vaginitis (2)	Prostatitis
Hearing loss (2)	Conjunctivitis
Lumbosacral strain or spasm (2)	Myalgia
Urethritis	Abdominal aortic aneurysm
Diabetic neuropathy	Adenopathy (benign)
Esophagitis	Inguinal hernia
Bipolar disorder	Cervical root compression
Labyrinthine dysfunction	Acromioclavicular arthritis
Paroxysmal atrial tachycardia	**Laboratory and X-ray**
Eczema	Benign liver cyst
Congestive heart failure	Trichomonal vaginitis
"Polypharmacy"	Non-A, non-B hepatitis
Tinea cruris	Osteoarthritis
Esophageal reflux	Hemochromatosis
C-6 nerve root compression	Hypothyroidism
Migraine headache	Esophagitis
Tension headache	Hypercholesterolemia
Ruptured posterior tibial tendon	Villous adenoma of the colon
Dementia	
Low back syndrome	
Anxiety	
Exercise-induced asthma	

CVA = cerebrovascular accident

*Numbers in brackets indicate diagnoses that were made more than once.

Several authors have stated that students typically prefer diagnostic tests and broad "search-and-seek" methods in making medical diagnoses,[8,9] whereas experts place more emphasis on the history. Rich and colleagues found that medical residents' perceptions of the history as a useful diagnostic tool increased during their training, perhaps as their interview techniques improved.[7]

Because of the usefulness of the history, we suggest that more time should be devoted to improving history-taking skills during clinical training. For example, trainees should spend more time observing an experienced clinician during an interview and vice versa. In addition, more value should be placed on history taking in terms of reimbursement. This might encourage physicians to develop their interviewing skills more fully and to spend more time talking to their patients.

While the physical examination and the laboratory investigation led to fewer diagnoses than the history in our study, they did help to increase the physicians' confidence in their diagnoses. Another aspect of the usefulness of the laboratory evaluation lies in the normal data that it can provide. For example, a normal coronary angiogram can be helpful in managing a patient with chest pain.

The categorization of some of the diagnoses in Table 2 may seem improbable at first glance. For example, making a diagnosis of monilial vaginitis from the history may seem unlikely. In this situation, the clinician interviewed a woman with diabetes mellitus who had vaginal itching, a perineal rash, and a cheesy discharge but no dysuria. He was able to list the correct diagnosis first on the differential diagnosis list after the history was taken. Similar concerns arose about making the diagnoses of osteoarthritis, Gilbert's syndrome, and paroxysmal atrial tachycardia after the history. Again, careful history taking allowed the physicians to place the correct diagnoses first on the differential diagnosis list.

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HEARD

When she is sewing, Mrs. Dowe can't feel the needle between her finger and thumb. Her doctor says his tests don't show anything. Her best friend's doctor says he can't find any evidence of it and for her simply to ignore it since she can still sew. Her neighbor's doctor says it seems like an odd complaint and he can't find anything wrong with her. Thus, she goes to Dr. Campbell, whom her hairdresser mentions. He says, "Yes, this could be, even though there isn't a test sensitive enough to pick up on it." Since seeing Dr. Campbell, nothing has changed, except that Mrs. Dowe doesn't have a need to mention it to anyone again, and is hardly aware that it even exists.

STEPHANIE MENDEL©
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